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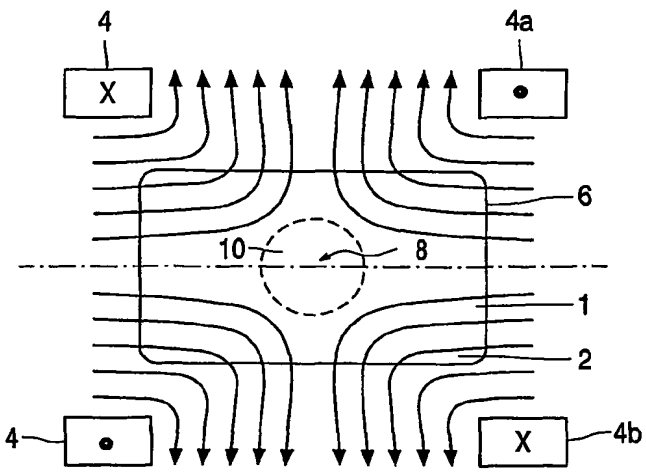
(54) Title: METHOD OF DETERMINING STATE VARIABLES AND CHANGES IN STATE VARIABLES



(57) Abstract: The present invention relates to a method of determining physical, chemical and/or biological state variables, particularly substance concentrations, temperature, pH and/or physical fields, and/or the change in these state variables in an examination area of an examination object by determining the change in the spatial distribution of magnetic particles in this examination area as a function of the effect of influencing variables on at least a partarea and/or in the conditions in at least a part-area of the examination area, by means of the following steps: a) introducing magnetic particles into at least part of the examination area in a first state in which the examination area or in parts thereof at least some of the magnetic particles that are to be examined are agglomerated and/or coupled to one another in pairs or more, or introducing magnetic particles into at least part of the examination area in a second state in which the particles are deagglomerated and/or decoupled and can be agglomerated and/or coupled, b) generating a magnetic field with a spatial profile of the magnetic field strength such that there is produced in the examination area a first part-area having a low magnetic field strength and a second part-area having a higher magnetic field strength, c) changing the, in particular relative, spatial position of the two part-areas in the examination area or changing the magnetic field strength in the first part-area so that the magnetization of the particles is locally changed, d) detecting signals that depend on the magnetization in the examination area that is influenced by this change, and e) evaluating the signals so as to obtain information about the change in the spatial distribution of the magnetic particles and/or about physical, chemical and/or biological state variables or the change therein in the examination area. The invention further relates to magnetic particle compositions, in particular functionalised magnetic particle compositions and their use in a method according to the invention. The invention further also relates to an apparatus for the measurement of state variables in the examination area.

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